Forensic Container Checkpointing and Analysis

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Agenda

Background
Use cases
Forensic Container Analysis
Future

Checkpoint/Restore in Userspace

CRIU

Multiple Integrations Exist

Container Live Migration

OpenVZ

Container Live Migration

Borg

Container Live Migration

LXC/LXD

Container Live Migration

Docker

Container Live Migration

Podman

Container Live Migration

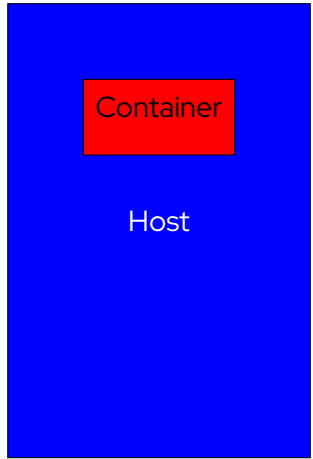
CRI-O

Forensic Container Checkpointing

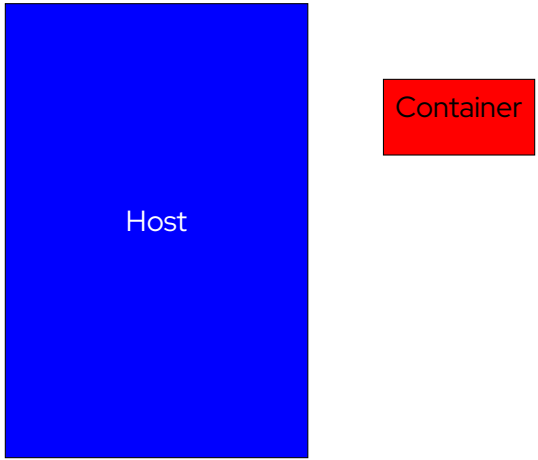
- https://github.com/kubernetes/enhancements/pull/1990
- https://github.com/kubernetes/enhancements/pull/3264
- https://github.com/kubernetes/kubernetes/pull/104907
- https://kubernetes.io/blog/2022/12/05/forensic-container-checkpointing-alpha/
- https://kubernetes.io/blog/2023/03/10/forensic-container-analysis/

Use Cases

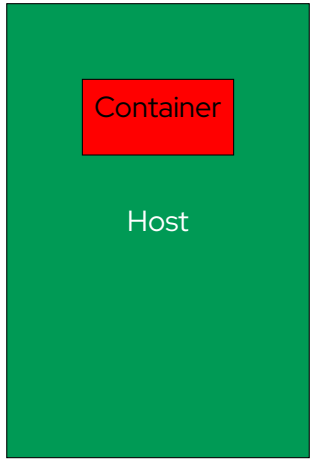
Reboot and Save State



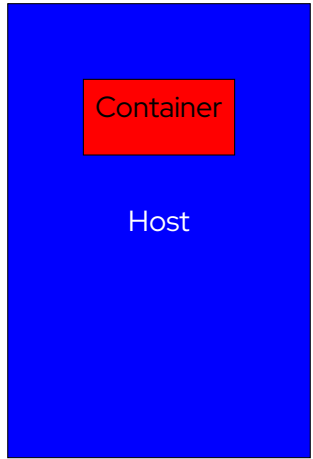
Red Hat




Container



Quick Startup



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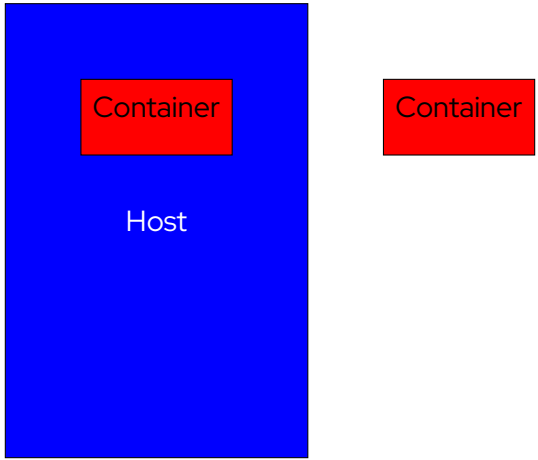

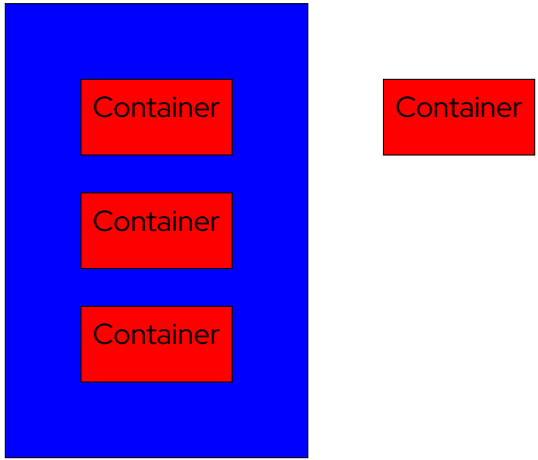

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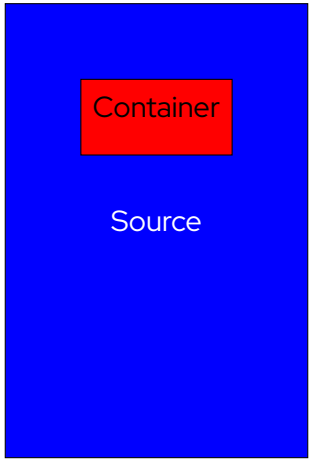
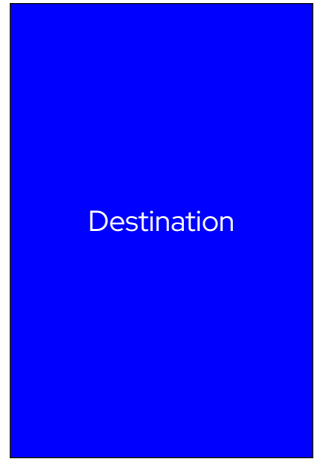
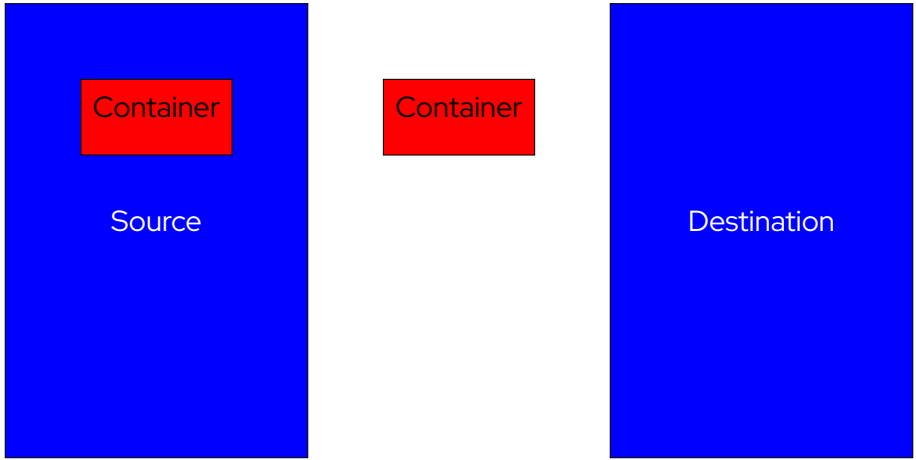
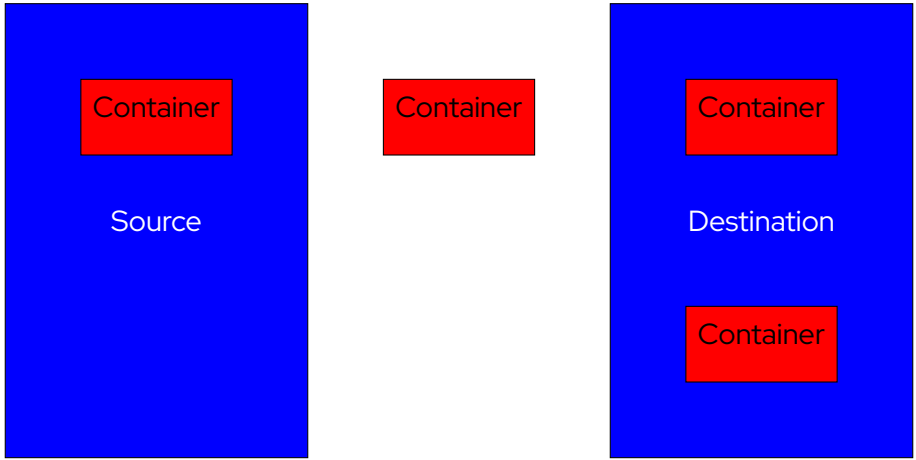
Container Live Migration








Container
Source
Container
Container
Destination
Container

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Spot instances

Forensic Container Analysis

Forensic Container Analysis

`checkpointctl`

Forensic Container Analysis

`crit`

Forensic Container Analysis

`grep`

Forensic Container Analysis

gdb

What’s next?

kubectl checkpoint

Pod Checkpoint/Restore

kubectl migrate

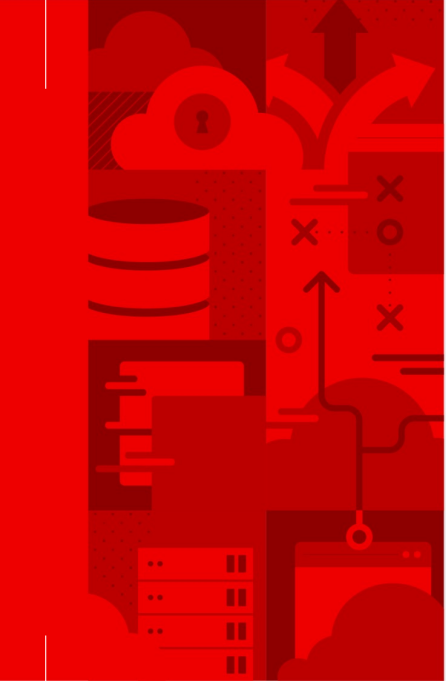
Scheduler Integration

Checkpoint Image Standard

https://github.com/opencontainers/image-spec/issues/962

Summary

- CRIU can checkpoint and restore containers
- Integrated in different containers engines
- Used in production
- Reboot into new kernel without losing container state
- Start multiple copies
- Migrate running containers
- Spot instances
- Forensic container checkpointing (KEP #2008)



Thank you

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